

Carotico-cavernous fistula:

- Classification: **Barrows** classification
 1. Type A: direct fistula- tear of ICA caused by fracture of base of skull, penetrating injury, rupture cavernous ICA aneurysm or connective tissue disease(Ehler-Danlos, fibromuscular dysplasia) and iatrogenic transphenoidal, RF for trigeminal neuralgia etc.
 2. Type B: dural AVF fed by branches of ICA
 3. Type C: dural AVF fed by ECA
 4. Type D: dural AVF fed by both ICA and ECA branches.
- Symptoms are due to increased pressure in the cavernous sinus and secondarily in the orbit through superior ophthalmic vein and increase in ICP through inferior petrosal sinus
 1. Pulsating exophthalmos, chemosis, and orbital swelling, **bruit in only 25%**.
 2. Diplopia (due to ischemia of III, IV, VI nerves secondarily to compression of vasa nervosum , secondary to pressure from aneurysm or secondary to mechanical restriction of extraocular muscles)
 3. Visual deterioration (ischemia of retina due to steal or venous hypertension and decrease in retinal perfusion or to increase in intraocular pressure)
 4. ICH or epistaxis rarely
- Diagnosis: Cerebral angiogram including the ECA and occasionally carotid test occlusion.
- Treatment:
 1. **Conservative**: carotid and jugular compression for 10 s using the contralateral arm if the symptoms are minimal, no visual impairment and no leptomeningeal venous drainage. Success rate 30% over 6 weeks for indirect fistula (B, C, D).
 2. **Endovascular embolisation** using detachable balloons or GDC is the treatment of choice for all types. It can be done under LA with continuous assessment of neurology, can be done immediately, the results can be evaluated immediately, it is safe and effective in occluding the fistula in **97%** with minimal risk of embolic complications
 - A. **Transatrial approach**: aiming at occluding the fistula and preserving ICA. Always do carotid occlusion test, in case ICA has to be occluded
 - B. **Transvenous** using superior ophthalmic vein or more commonly inferior petrosal sinus.
 3. Microsurgical approach: through pterional craniotomy and using the 8 sinus corridors (page 2346). 100% occlusion with 90% preservation rate for ICA and cranial nerves (Fukushima)
 4. **Stereotactic radiosurgery**: In one study **88%occlusion rate at 7 months** .Has the disadvantage of latent interval so it cant be used for patients with visual impairment, **high recurrence rate 22%, not effective in type A** because of the large defect and the long term of radiosurgery is not known some authors showed **cumulative risk 1.3% per year of developing malignancy (sarcomas) .**

